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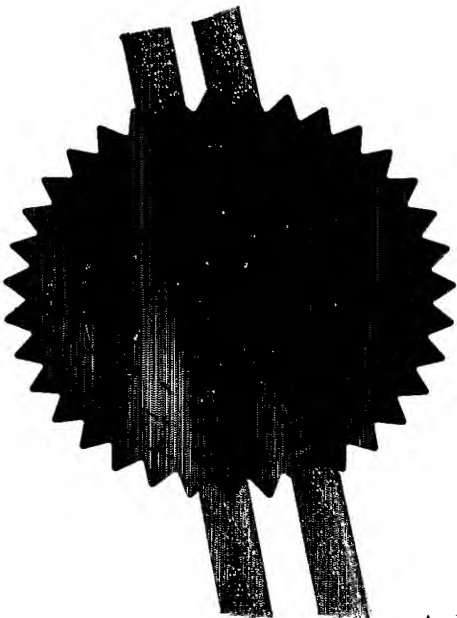
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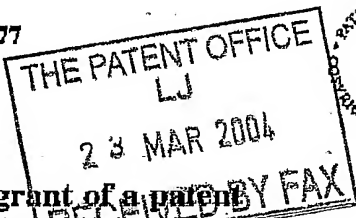
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2. Patent Application Number (The Patent Office will fill in this part)	0406497.8		23 MAR 2004
3. Full name, address and postcode of the or of each applicant (underline all surnames)	Dubois Limited Amaray House Arkwright Road Corby, Northants. NN17 5AE, G.B.  Patents ADP number (if you know it) 7269467002 If the applicant is a corporate body, give the country/state of its incorporation England and Wales		
4. Title of the invention	PACKAGING ARTICLE		
5. Name of you agent (if you have one)	Fry Heath & Spence LLP		
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Packaging Article

The present invention relates to beverage containers, and particularly relates to containers for supplying beverages to consumers. The invention has particular utility for the storage and supply of carbonated and other sparkling drinks, but is also suitable for use with other types of drinks.

For many years there has been a desire among drinks suppliers and container manufacturers to provide practical wide-mouth beverage supply containers which consumers may drink from comfortably in the same manner as from a drinks glass or other drinking vessel. Despite the tremendous advantages that such a beverage container would provide for drinks suppliers, container manufacturers and consumers alike, no successful beverage container that fulfils these aims has yet been produced. Consequently, bottles and ring-pull cans currently remain the main practical beverage supply containers for consumers. This is because there are significant technical problems associated with wide-mouth containers to overcome, and no practical solution to the problems has successfully been devised. The present invention aims to provide a practical beverage container.

A first aspect of the present invention provides a beverage container comprising a container body including an opening, preferably a wide-mouth opening, wherein the interior of the container body includes at least one securement means by which a cap may be releasably secured to the container body to close the opening.

The (or each) securement means preferably is provided on an internal surface of the container body.

The beverage container preferably includes the cap that may be releasably secured to the container body to close the opening. The cap preferably includes at least one securement means by which the cap may

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be secured to the container body, by engagement with the securement means of the container body. The (or each) securement means of the cap preferably is provided on the exterior of the cap, especially on a circumferential exterior surface of the cap.

The cap is releasably securable to the container body preferably by means of a threaded engagement with the container body. Consequently, the (or each) securement means of the container body and/or the cap preferably is a thread. The threaded engagement may comprise a bayonet-style engagement. Preferably, however, the threaded engagement is a screw-threaded engagement. The term "thread" as used herein includes (at least in the broadest aspects of the invention) continuous and discontinuous threads, (e.g. continuous and discontinuous screw threads), and bayonet-style threads, for example. Threads used in relation to the invention may, for example, comprise a plurality of segments (each thread segment comprising a said securement means), in which case the thread may either be discontinuous, or it may be substantially continuous because the effect is that of a substantially continuous thread pattern.

By a "wide-mouth opening" is meant (at least in its broadest sense) an opening of a size suitable for a person to drink from the container in the same manner as from a drinks glass or similar drinking vessel. That is, in its broadest sense, the wide-mouth opening of the container (for embodiments of the invention having a wide-mouth opening) generally renders the container suitable as a drinking vessel from which a beverage supplied in the container may be conveniently drunk (in contrast to conventional narrow-necked bottles and ring-pull cans which generally are not regarded as comfortable drinking vessels). In practice, this requirement means that the diameter of the wide-mouth opening of the container will normally need to be at least 40mm, preferably at least 45mm, and more preferably at least 50mm. Additionally, an excessively wide opening is generally difficult for the consumer to drink from, and thus the wide-mouth opening preferably has a diameter no greater than

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150mm, more preferably no greater than 100mm, and especially no greater than 80mm. A particularly preferred diameter range for the wide-mouth opening is 50 to 80mm, and examples of particular preferred diameters included 53mm and 63mm.

The container body preferably has no thread or thread segments on its exterior. Consequently, the container body preferably is comfortable for a consumer to drink directly from the container body.

A wide variety of thread forms for securing the cap to the container body, is possible. As indicated at the beginning of this specification, at least some embodiments of the invention are intended for the storage and supply of carbonated and other sparkling drinks, for example beers, ciders, sparkling wines (including champagne), other fizzy alcoholic beverages, and non-alcoholic fizzy and sparkling beverages, including sparkling water and carbonated soft drinks. For such beverages, it is preferred for the engagement between the cap and the container body to include provision for gas venting upon partial removal of the cap from the container body, to prevent so-called "missiling" of the cap whereby the cap is violently ejected from the container body as the container is opened, by the gas pressure of the contents of the container.

Advantageously, therefore, the container body and the cap may include means, preferably engageable elements, to block or restrict removal of the cap from the container body beyond an intermediate position (between fully secured and fully released) when the cap is under an axial pressure in a direction emerging from the container body. Such blocking or restricting means (e.g. engageable elements) preferably comprise parts of the thread on the cap and the container body.

Preferably the cap and the container body are constructed and arranged to provide a vent for venting gas from the container body at least when the cap is in an intermediate position (between fully secured and fully released).



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Preferred such thread constructions and arrangements are known (only for threads provided on the exterior of container bodies), for example from international patent applications WO 95/05322, WO 97/21602, WO99/19228 and WO 03/045805, the entire disclosures of which documents are incorporated herein by reference.

Documents WO 97/21602 and WO 03/045805 each disclose screw threads having regions of differing helix angles (incorrectly referred to in those documents as the "pitch" of the screw threads). Screw threads of these types are preferred for the container body and/or cap of the present invention.

Preferably, the thread of the container body or the cap comprises a plurality of first thread segments. The thread of the other of the cap or the container body preferably comprises a plurality of second thread segments. The second thread segments preferably have lower thread surfaces, the helix angle of the lower second thread surface being relatively low, at least in a first region. Preferably the helix angle of the lower second thread surface is relatively high in a second region displaced from the first region in an unscrewing direction. Such a thread arrangement may combine the advantages of conventional helical screw threads and bayonet-style threads. This is because the use of a screw thread has the advantage that, in comparison to a bayonet-style thread, only a relatively small axial force is required to secure the cap on the container body, but the transition to a relatively low helix angle region of the thread (from a higher helix angle region) as the cap is screwed onto the container body means that this region can provide greater security (akin to a bayonet fitting) against accidental unscrewing of the cap from the container body under an axial force from pressurized contents of the container than could be the case with a conventional helical screw thread having a single helix angle.

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Preferably the differing helix angle screw thread embodiments described above also include the means (e.g. engageable elements) to block or restrict removal of the cap from the container body beyond an intermediate position when the cap is under an axial pressure in a direction emerging from the container body, as also described above. The engageable elements preferably comprise a step or recess formed in the lower second thread surface to provide a first abutment surface, and a second abutment surface on a first thread segment against which the step or recess may abut. Preferably the helix angle of the lower second thread surface is relatively low in a third region adjacent to the step or recess in the lower second thread surface.

By "lower thread surface" is meant the thread surface that prevents the axial separation of engaging threads under axial forces directed to cause such separation. For example, in relation to a thread on the container body, the "lower thread surface" is the surface of the thread further from the wide-mouth opening. For embodiments of the invention in which the cap includes a bore plug carrying a thread for engagement with the container body, the "lower thread surface" of the thread is the surface further from the bottom (open end) of the bore plug.

Preferably the thread regions of relatively low helix angle have a helix angle of no greater than 10 degrees (with respect to a plane in which the opening lies). More preferably the helix angle of the low helix angle regions is no greater than 7 degrees, especially no greater than 6 degrees. Preferably the helix angle of the thread regions of relatively high helix angle is greater than 10 degrees, for example in the range 12 to 20 degrees.

The screw threads by which the cap and the container body mutually engage preferably each comprise a plurality of segments. The segments of the thread on the container body preferably are shorter than the segments of the thread on the cap, but the converse may instead be the case. The shorter thread segments preferably each extend no more

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than 30 degrees, more preferably no more than 15 degrees, especially no more than 10 degrees of arc around the internal circumference of the container body (or alternatively around the external circumference of the cap). The threads on the cap and the container body which secure the cap and the container body together preferably are substantially as disclosed in WO 03/045805 (except that in that document the threads on the container body are exterior threads, and those on the cap are interior threads, whereas in the present invention the converse is the case).

In preferred embodiments of the invention, the cap and the container body include engagement means to secure the cap on the container body by substantially preventing rotation of the cap with respect to the container body under the influence of a force acting in a direction emerging from the container body substantially perpendicular to a plane in which the wide-mouth opening lies. In particular, the engagement means preferably prevent the initiation of such rotation of the cap with respect to the container body, when the cap is fully secured on the container body. The engagement means may, for example, comprise one or more protruding and/or recessed members of the cap and the container body. The engagement means may comprise part of the threaded engagement between the cap and the container body (i.e. part of their threads). Alternatively, the engagement means may be spaced apart from the threaded engagement. For example, the engagement means on the container body may be below the thread, on the opposite side of the thread from the opening. The engagement means on the cap may be lower on a bore plug of the cap than the thread of the cap. The engagement means are arranged to prevent accidental "backing off" (i.e. unscrewing) of the cap from its fully closing and sealing position on the container body. Some preferred forms of such engagement means are disclosed in WO 91/18799, the entire disclosure of which is incorporated herein by reference. The engagement means disclosed in that document are provided on the exterior of the container body and on the interior of the cap, whereas in the present invention the converse is preferably the case.

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The cap preferably includes tamper-evident means, for example a tamper-evident band or ring. The tamper-evident means provides an indication that the cap has previously been released from the container body. The tamper-evident means is advantageously provided on the exterior of the cap.

The container preferably includes at least one sealing member to form a seal between the cap and the container body when the cap is secured thereon. The (or each) sealing member may, for example, form part of the cap and/or the container body, or it may be a separate member.

The container and its components may be made from any suitable material, including metal and/or glass and/or polymer material. However, polymer materials are generally preferred. Polyolefins are especially preferred, for example polyethylene terephthalate (PET). The container components preferably are formed by moulding, especially injection moulding and/or blow moulding.

Some preferred embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, of which:

Figure 1 shows two beverage container embodiments of the invention;

Figure 2 shows a detail of one of the embodiments of Figure 1, with the cap separated from the container body;

Figure 3 shows the same detail as Figure 2, with the cap secured to the container body;

Figure 4 shows the detail of Figure 2 in cross-section;

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Figure 5 shows the detail of Figure 3 in cross-section;

Figure 6 shows a detail of the second embodiment of Figure 1, with the cap separated from the container body;

Figure 7 shows the detail of Figure 6 in cross-section; and

Figure 8 shows the detail of Figure 7 with the cap secured to the container body.

Figure 1 shows two containers, 1a and 1b, according to the invention. Each container 1 comprises a container body 2 and a cap 3 secured to the container body to close a wide-mouth opening provided in the container body. The container bodies are transparent, showing internal screw thread arrangements indicated generally by reference numeral 17, which are shown in greater detail in subsequent drawings, and described below. Threads are provided on the interior of the container body 2 and on the exterior of the cap 3.

Figure 2 shows a detail of embodiment 1a of Figure 1, with the cap 3 separated from the container body 2. The cap 3 is releasably securable to the container body 2 by means of the threaded engagement 17. Additionally, as supplied by the drinks supplier (with a beverage contained in the container) the cap 3 includes a tamper-evident band 19. Breakable connections (not shown) between the tamper-evident band 19 and the remainder of the cap 3 must be broken in order to remove the cap 3 from the container body 2. (The detail shown in Figure 2 is prior to initial securing of the cap to the container body by the drinks supplier, hence the tamper-evident band is attached to the cap despite the cap being separated from the container body.)

The screw threads on the container body 2 and cap 3 each comprise a plurality of thread segments (referred to more generally herein

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as "securement means"). As shown in Figure 2, the threads are "eight-start" threads (i.e. there are eight start positions for the thread around the circumference of the container body/cap). The eight first thread segments 21 on the container body are short in length, each extending approximately 10-15 mm around the internal circumference of the container body. The lower thread surface of the first thread segments has a helix angle of approximately 6 degrees (i.e. a low helix angle), and the upper thread surface has a helix angle of approximately 13.5 degrees (i.e. an intermediate helix angle). As explained earlier in this specification, the "lower thread surface" in this context is the surface of the thread on the container body that is further from the wide-mouth opening, and the "upper thread surface" is the surface closer to the wide-mouth opening.

The eight second thread segments 23 on the cap 3 are provided on a bore plug 25 of the cap 3, which is received within the container body when the cap is secured thereto. The second thread segments 23 on the bore plug 25 of the cap 3 each have a lower thread surface 27 and an upper thread surface 29. The "lower thread surface" in this context is the surface of the thread on the cap 3 that is further from the end of the bore plug 25 of the cap that extends the furthest into the container body. The upper and lower second thread surfaces define a substantially continuous generally helical path 31 between axially adjacent thread segments. The lower thread surface 27 of each second thread segment comprises a relatively low helix angle first region 33, a relatively high helix angle adjacent second region 35 (in an unscrewing direction) and a further relatively low helix angle adjacent third region 37 (in an unscrewing direction). The first and third regions each have a helix angle of approximately 6 degrees, and the second region has a helix angle of approximately 25 degrees. The average helix angle of the lower thread surfaces of the second thread segments is approximately 13 degrees.

The first and second thread segments also include provision for gas venting upon partial removal of the cap from the container body, to prevent "missiling" of the cap whereby the cap is violently ejected from

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the container body as the container is opened by the consumer, due to the gas pressure of the contents of the container, when the container holds a carbonated beverage. This gas venting provision takes the form of engageable elements on the first and second thread segments to block or restrict removal of the cap beyond an intermediate position when the cap is under an axial pressure in a direction emerging from the container body, and gas vents to allow the escape of gas from the container between the thread segments when the cap is in its intermediate position. The engageable elements of the thread segments comprise a step 39 on each of the second thread segments, and a leading edge 41 (leading in the unscrewing direction) of each of the first thread segments. The gas vents comprise gaps 43 between second thread segments 23 and spaced apart extensions 42 of the second thread segments, as well as gaps between the axially adjacent thread segments in the helical paths 31.

When the cap 3 is fully screwed onto the container body 2 as shown in Figure 3, the lower thread surface of each first thread segment 21 is engaged with the relatively low helix angle first region 33 of the lower surface of a respective second thread segment 23. In this fully screwed-on position, a leading edge 44 (leading in the screwing-on direction) of the first thread segment 21 butts against a longitudinally-oriented edge 46 of the extension 42 of a respective second thread segment 23. The low helix angle of the first thread segment 21 and the first region 33 of the second thread segment means that there is little tendency for any internal gas pressure (due to carbonated contents of the container) acting on the cap and the container body to be converted into rotational motion causing the cap to unscrew from the container body. However, in order to ensure that there is no tendency for the cap to unscrew from the container body, the cap and the container body may include engagement means that substantially prevent such an "accidental" unscrewing motion. The engagement means may, for example, comprise protruding and/or recessed members 45 of the cap and the container body, and they may be spaced apart from the screw threads, as shown in Figure 2.

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(Alternatively, the engagement means may comprise protruding and/or recessed members of the screw threads themselves.)

In order to unscrew the cap 3 from the container body, a minimum initial unscrewing torque to overcoming the resistance of the engagement means 45 and the friction of the engaging thread segments is required. Subsequently, if the container contains a carbonated (or otherwise fizzy) beverage, the gas pressure in the container will tend to force the cap to unscrew until it reaches the intermediate position whereby the first thread segments 21 abut against respective steps 39 provided on the second thread segments. Once sufficient gas has vented from the container, the cap may be pushed back towards the container body slightly to enable the first thread segments to clear the steps 39 and thus to release the cap from its engagement with the container body.

As shown in figures 2 and 3 and mentioned above, the cap 3 preferably includes a tamper-evident band or ring 19 that is severed from the remainder of the cap 3 when the cap is removed from the container body 2 for the first time. The tamper-evident band 19 is severed from the remainder of the cap 3 on removal of the cap from the container body 2, by virtue of a peripheral retaining lip 47 provided on the container body, which retains the band 19 on the container body.

Figure 4 shows the detail of Figure 2 in cross-section, and Figure 5 shows the detail of Figure 3 in cross-section. As can be seen most clearly in these figures, the end of the bore plug 25 that extends furthest into the container body 2 when the cap 3 is secured thereto, includes a sealing member 5 to form a seal between the cap and the container body. As drawn, the sealing member comprises a resiliently flexible fin that is integrally formed with the cap. (However, alternative sealing members and sealing arrangements are possible, including separate sealing members placed between the cap and the container body, for example at the wide-mouth opening of the container body.) The sealing member 5 seals against an internal flange 7 provided inside the container body,



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against which the end of the bore plug 25 seats when the cap is fully secured to the container body, as shown in Figure 5.

Figures 6, 7 and 8 are equivalent to figures 2, 4, and 5, except they show embodiment 1b rather than embodiment 1a. Embodiment 1b is substantially identical to embodiment 1a, except that the cap 3 of embodiment 1b includes a large external skirt portion 9 that extends over the outer periphery of the container body 2 when the cap 3 is secured thereto. Consequently, the lip 47 provided on the periphery of the container body 2 to retain the tamper evident band is spaced further from the wide-mouth opening in the 1b embodiment than in the 1a embodiment. Additionally, the bore plug 25 of the 1b embodiment extends further into the container body than does the bore plug of the 1a embodiment.

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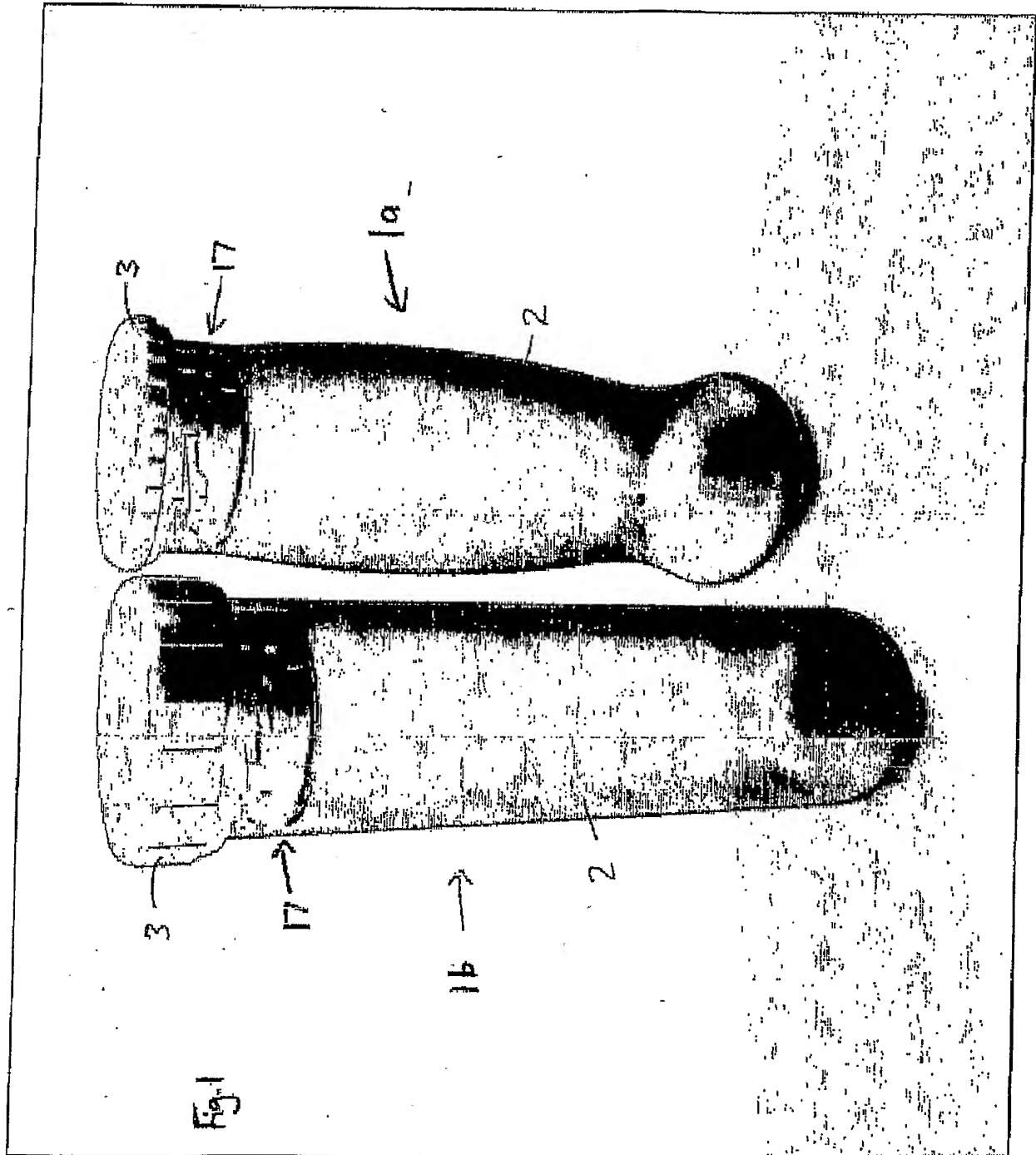




Fig. 2

1a →

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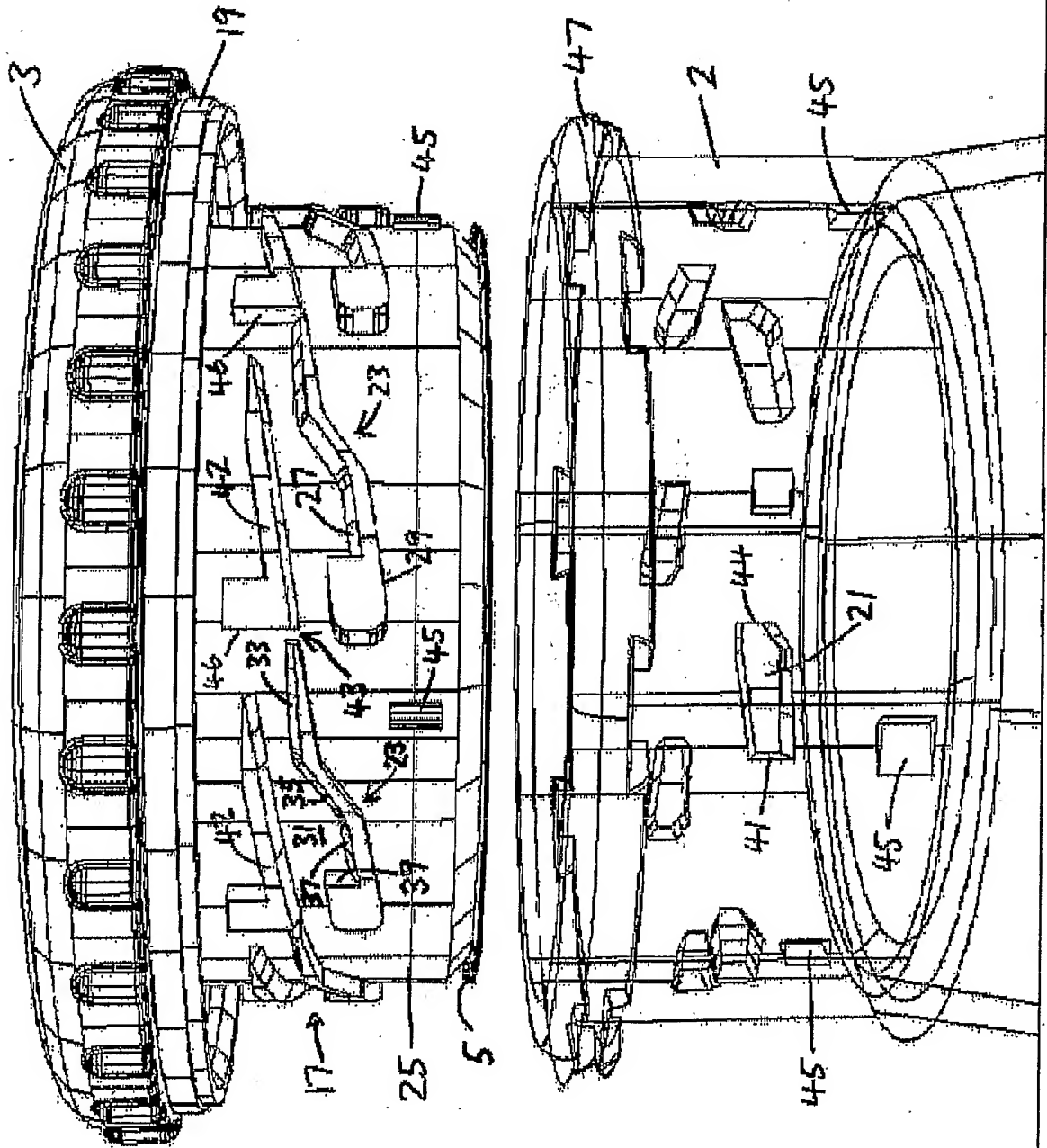
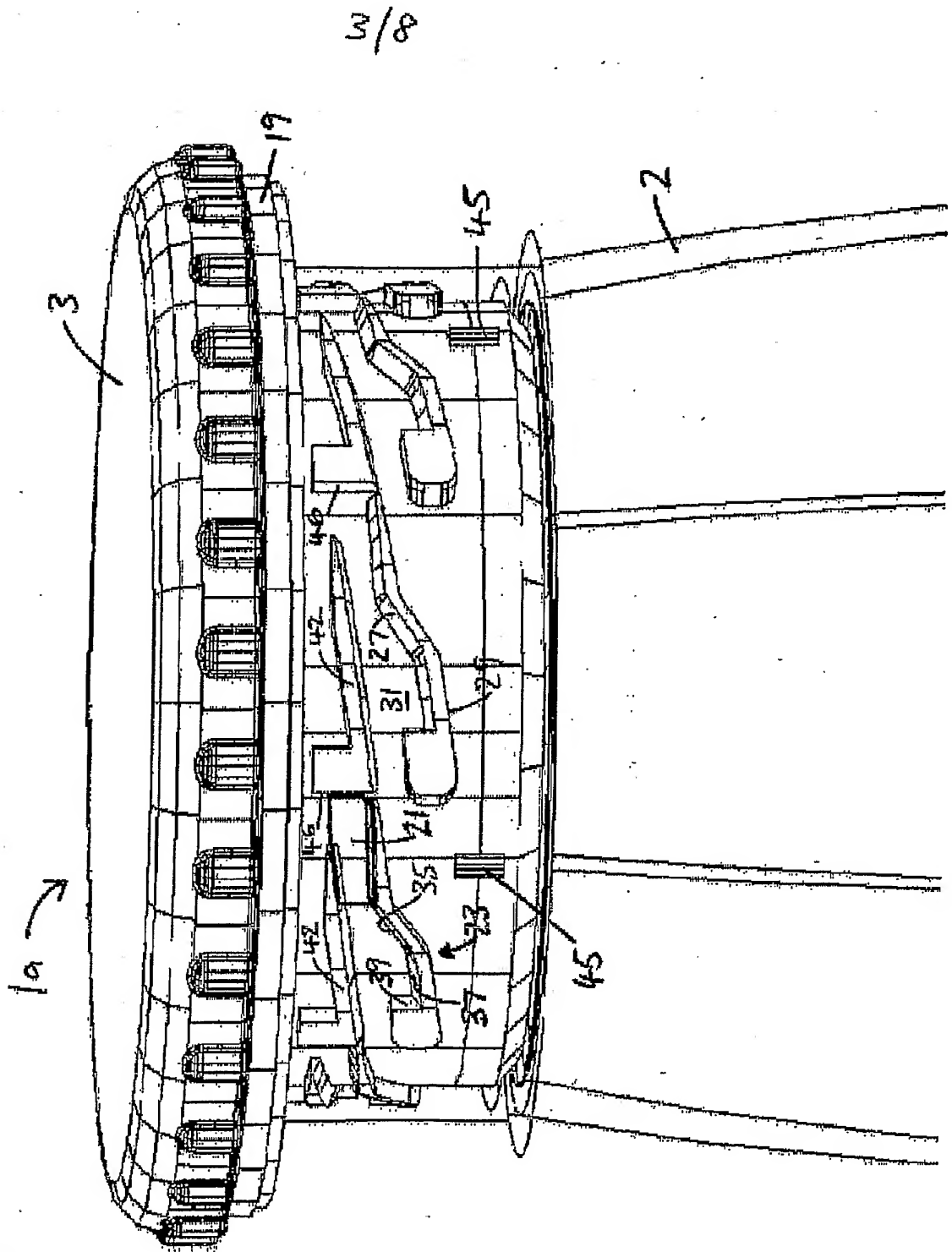


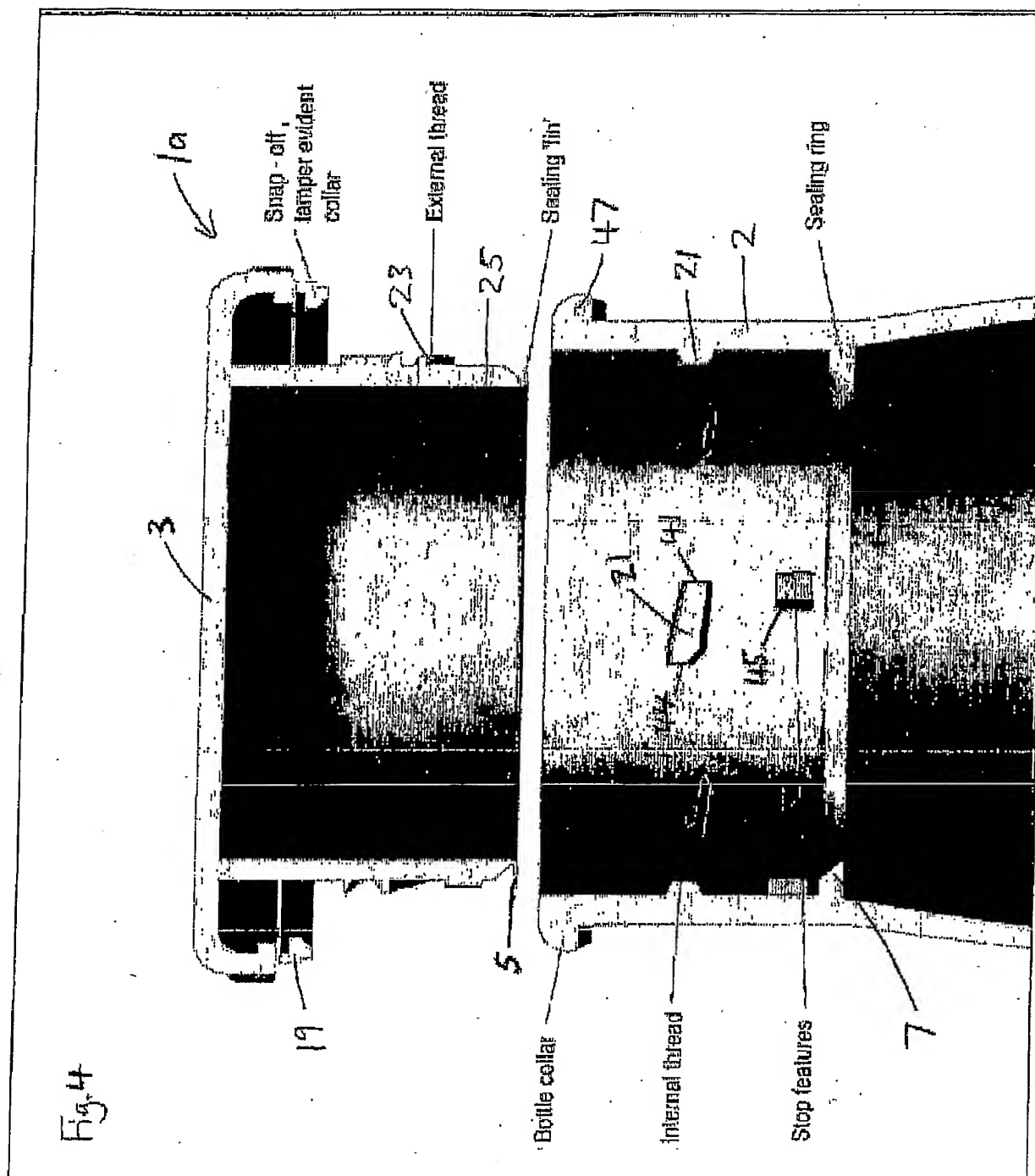


Fig. 3

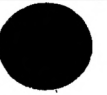




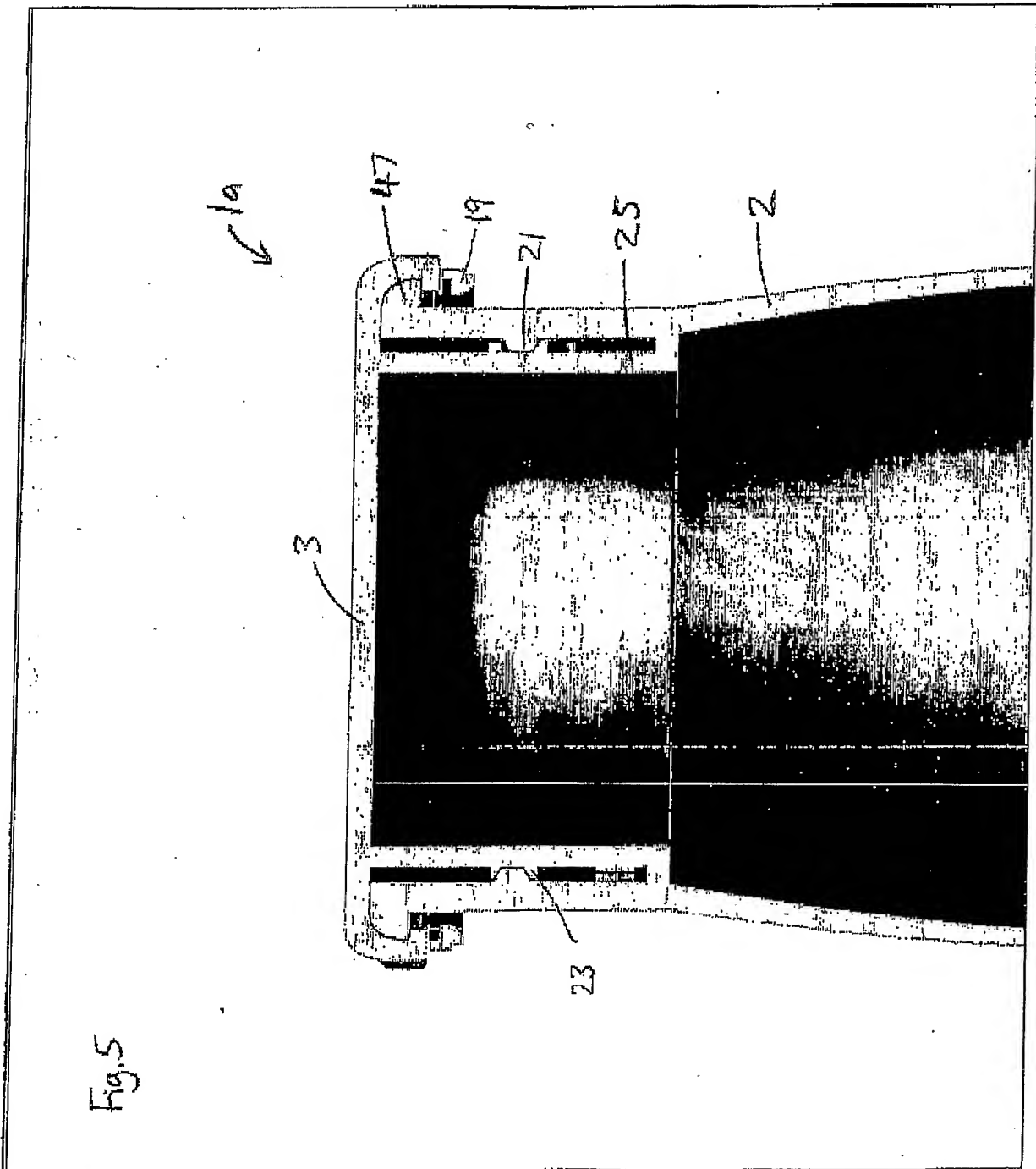
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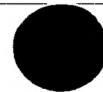






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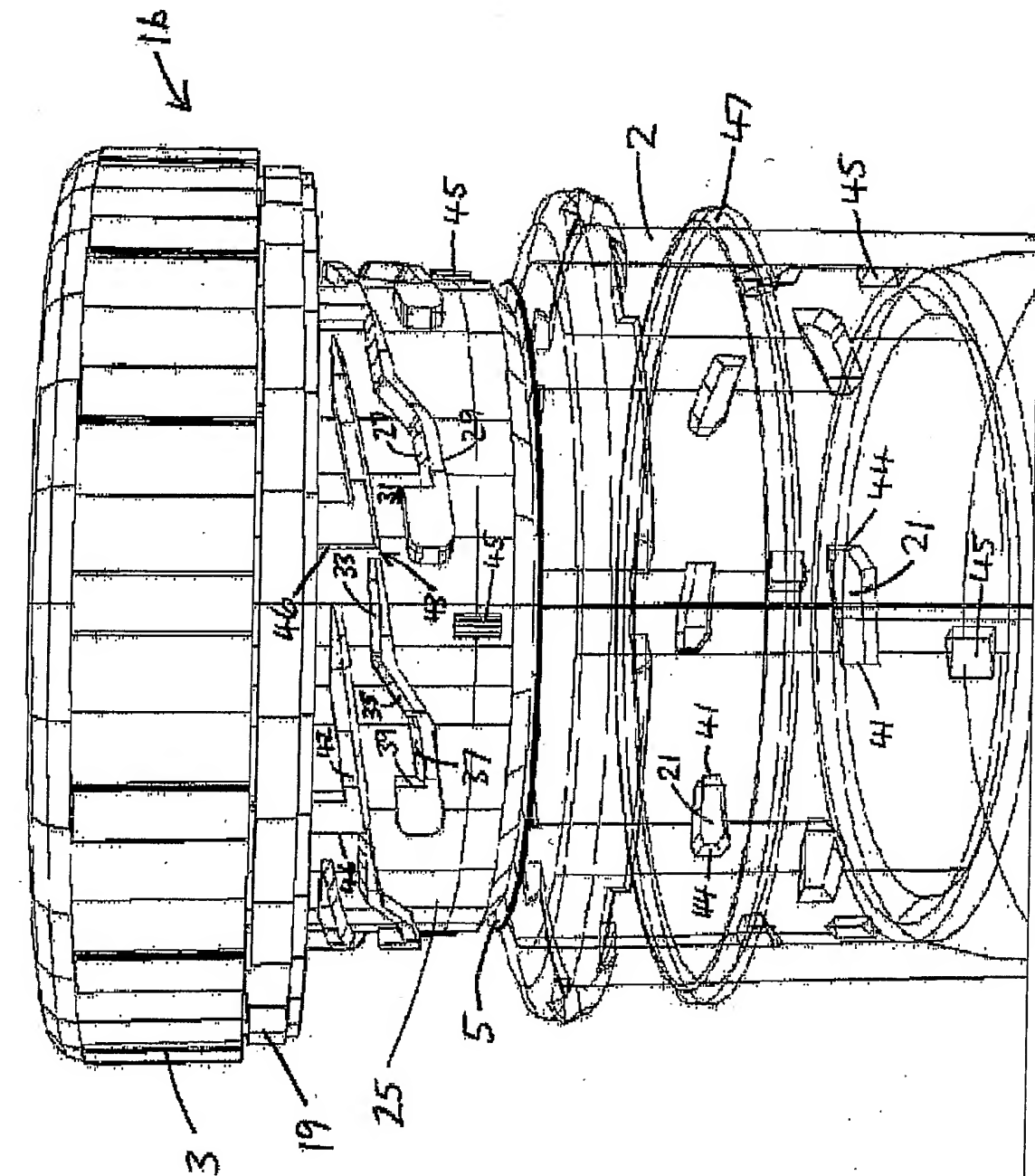
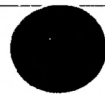
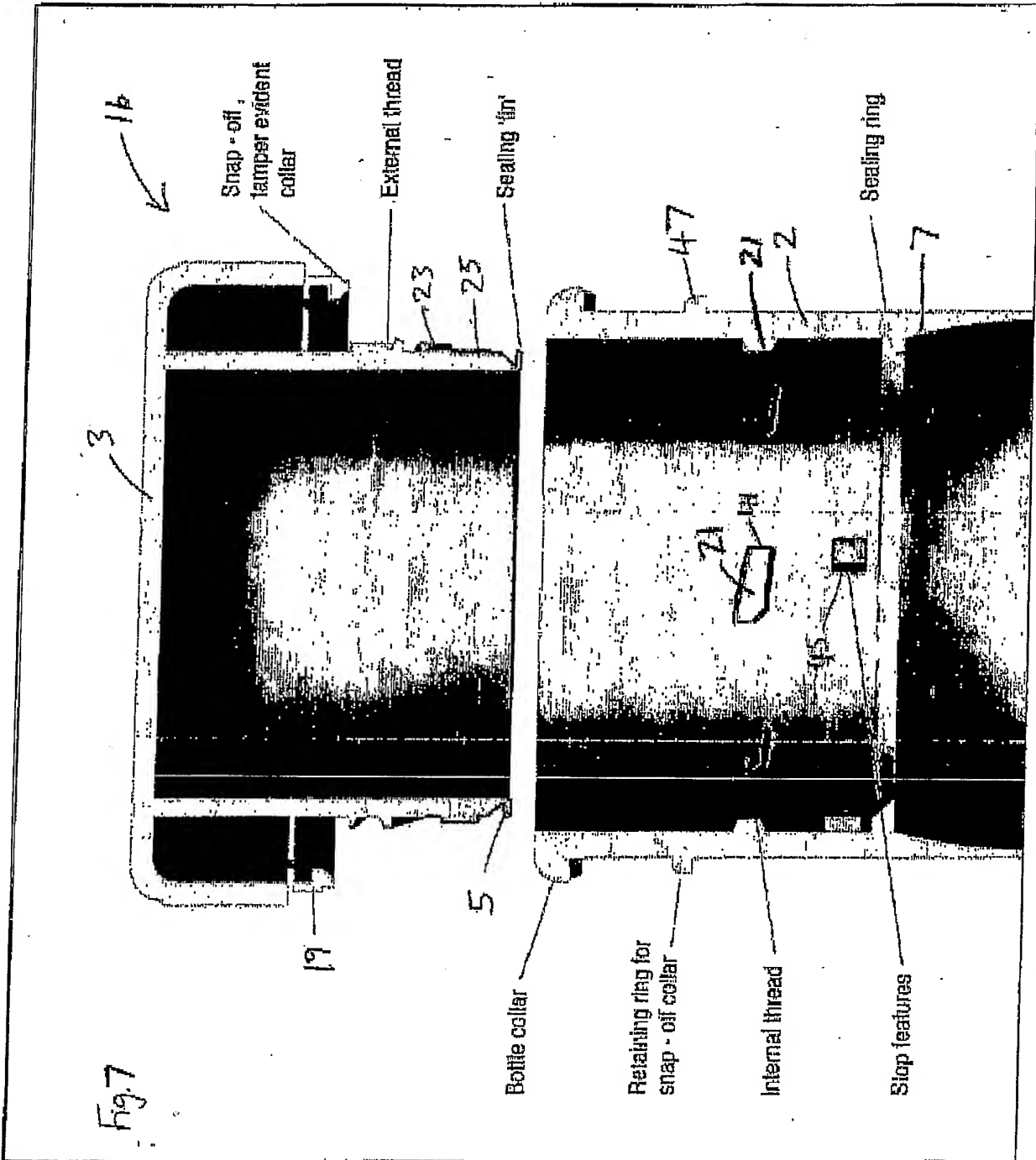


Fig. 6



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